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**Genetics of flax.**—Miss TAMMES<sup>26</sup> has made a genetical study of the flower characters of 6 varieties of the common flax, *Linum usitatissimum*. These varieties consisted of 3 dark blue, 1 light blue, and 2 white varieties. Besides the color of the flower, with which she worked chiefly, she studied the color of the anthers, the color of the seeds, the shape of the petals, the color of the veins in the petals, and the number and viability of the seeds produced. These latter characters she finds correlated with the color of the flower and dependent upon the same factors. The several varieties are described and their genetic formulae given, after which the author presents in tabular form the expected ratios and the observed results in the second and third generations. She concludes that the blue color is the result of two complementary factors, *B* and *C*. The presence of these two factors alone produces the light blue flowers, and the dark blue is brought about by the action of an intensifying factor *A* co-operating with *B* and *C*. Unless both *B* and *C* are present the flower will be white. The factor *A* acts as an intensifier only on the light blue of the petals and has no effect on the color of the anthers, on the color of the seed, or on the color of the veins in the petals. The factor *B* is not only one of the necessary factors for the production of the blue flower color, but even without the cooperation of *C* brings about the blue color of the anthers and the brown color of the seeds, prevents the crinkling of the petals which, were it not present, would be caused by the presence of *C*, and overcomes the tendency of *C* to lessen the number and viability of the seeds. The factor *C*, besides producing, with *B*, the blue color of the flower, brings about, when in a homozygous condition, a deeper pigmentation of the veins in the petals; and causes, when *B* is absent, a crinkling of the petals and a lessening in the number and viability of the seeds. In respect to the color of the anthers, which results from the presence of *B*, it is pointed out that although the 6 varieties studied are in agreement with the interpretation given, there is a variety, which has not yet been studied, that has blue flowers and *yellow* anthers. As this is contrary to the conclusions arrived at from the 6 varieties investigated, the author suggests that the factor *B* may be, not a single unit, but a complex, with some essential part or factor lacking in the variety with blue petals and yellow stamens. On the other hand, *B* may be a unit and the blue anthers may be lacking because some other necessary factor besides *B* is lacking in that variety. An investigation of this problem is promised.—BEN C. HELMICK.

**Physiological temperature and moisture indices.**—In extending his studies of the derivation and use of indices of temperature in relation to plant growth, LIVINGSTON<sup>27</sup> distinguishes 3 classes of such indices. The first is the sum-

<sup>26</sup> TAMMES, TINE, Die genotypische Zusammensetzung einiger Varietäten derselben Art und ihr genetischer Zusammenhang. Extrait Recueil Trav. Bot. Néerland. 12:217-278. 1915.

<sup>27</sup> LIVINGSTON, B. E., Physiological temperature indices for the study of plant growth in relation to climatic conditions. Physiol. Researches 1:399-420. figs. 4. 1916.

mation of the daily mean temperature, above a certain fixed minimum, throughout the growing season. Such indices of temperature efficiencies for plant growth have been used largely by phenological students, notably in MERRIAM'S "law of temperature control." An advance upon this method was suggested by LIVINGSTON,<sup>28</sup> based upon the supposition that growth rate may follow the chemical principle of van't Hoff, doubling with each increase of temperature of 10° C., and the present publication proposes to give the indices a value based upon physiological experiment. LEHENBAUER'S<sup>29</sup> recent experiments upon the growth rate of maize seedlings at different temperatures affords data for the derivation of these indices which surpass those formerly proposed in taking account of the recognized principle of temperature minima, optima, and maxima; and also in showing a much greater rate of increase of index value with rising temperature between 2° and 32° C. Charts showing the climatic zonation of the United States according to each of the 3 classes of indices are suggestive and interesting for study and comparison. The third method clearly surpasses the others in correctness of principles involved, and its indices are used by the same author<sup>30</sup> in deriving a single index for both temperature and moisture. As a measure of the moisture conditions, the ratio of annual rainfall to annual evaporation as suggested by TRANSEAU is used, and this ratio is multiplied by the summation index of temperature efficiency for the same period, and the product is the proposed moisture-temperature index. The general scheme is a good one, and the resulting zonation of the United States is interesting in spite of the utter inadequacy of the evaporation data. It may be doubted also whether this rainfall evaporation ratio expresses the moisture conditions which determine plant growth as well as the soil moisture-evaporation ratio suggested by the reviewer. It is true that here again the lack of data will prevent the effective use of this ratio for years to come.—GEO. D. FULLER.

**Taxonomic notes.**—COLLINS and HOWE,<sup>31</sup> in studying specimens of red algae from Bermuda, southern Florida, and North Carolina, have recognized 4 new species of *Halymenia*.

SAFFORD<sup>32</sup> has published *Desmopsis* as a new genus of Annonaceae, to include 5 species from Mexico, Panama, and Costa Rica, that differ in several important characters from the Old World *Desmos* (*Unona* Vahl).

<sup>28</sup> LIVINGSTON, B. E., BOT. GAZ. 56:349-375. 1913.

<sup>29</sup> LEHENBAUER, P. A., Growth of maize seedlings in relation to temperature. Physiol. Researches 1:247-288. 1914.

<sup>30</sup> LIVINGSTON, B. E., A single index to represent both moisture and temperature conditions as related to plants. Physiol. Researches 1:421-440. fig. 1. 1916.

<sup>31</sup> COLLINS, F. S., and HOWE, M. A., Notes on species of *Halymenia*. Bull. Torr. Bot. Club 43:169-182. 1916.

<sup>32</sup> SAFFORD, W. E., *Desmopsis*, a new genus of Annonaceae. Bull. Torr. Bot. Club 43:183-193. pls. 7-9. fig. 1.